

Atty. Docket No. YOR20010010US1
(590.043)

REMARKS

Applicants and the undersigned are most grateful for the time and effort accorded the instant application by the Examiner. Claims 1-17 were pending in the instant application at the time of the outstanding Office Action. Claims 1, 9, and 17 are independent claims; the remaining claims are dependent claims. The Office is respectfully requested to reconsider the rejections presented in the outstanding Office Action in light of the following remarks.

Claims 1-4, 9-12, and 17 stand rejected under 35 USC § 102(b) as being unpatentable over Flanagan et al. Various dependent claims stand rejected under 35 USC 103(a) over Flanagan et al. in combination with various references. Claims 5 and 13 stand rejected under 35 USC 21 103(a) as being unpatentable over Flanagan et al. in view of Beirle. Claims 6 and 14 stand rejected under 35 USC § 103(a) as being unpatentable over Flanagan et al. in view of Beirle and further in view of Sonmez et al. Claims 7 and 15 stand rejected under 35 USC § 103(a) as being unpatentable over Flanagan et al. in view of Beirle and Sonmez et al. and further in view of Ammar et al. Reconsideration and withdrawal of the present rejections is hereby respectfully requested.

Applicants have rewritten dependent Claims 2 and 10 to more closely track the language of independent Claims 1 and 9, and it is believed these rewritten dependent claims are also allowable. Applicants, however, intend no change in the scope of the claims by the changes made by this amendment. It should also be noted these

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amendments are not in acquiescence of the Office's position on allowability of the claims, but merely to expedite prosecution.

As best understood, Flanagan et al. appears to be directed to a speech recognition system for use in an environment where the speaker is at a distance from the sound pickup device. (Col. 1, lines 14-17) In particular, Flanagan et al. appears to transform distant speech (speech recorded with a distant mic) into close-talk speech (speech recorded with a close mic) using a neural network. The training of the neural network uses two recordings of the SAME signal: the same speech recorded by a far away mic and a close mic. At test time, when the neural network is used to compensate for channel mismatch (different mic location), only one single channel is used: the distant speech and the neural network's output is the estimated close-talk version of the distant speech. Thus in the system of Flanagan et al. there is no interfering signal. Rather, the same signal is recorded at different location (with close and distant microphones) - the two channels containing the two recordings of the same signal are used only during the training phase of the neural network - it does not compensate for interference or noise but ONLY for channel mismatch (channel is different when speech is close or far from mic). When the Flanagan et al. system is operating, i.e., trying to compensate for the channel, there is only one channel input available: the distant speech.

Transforming distant speech into close speech in Flanagan et al. stands in stark contrast to the present invention. As discussed in the specification, the present invention generally relates to the multi-channel separation of a desired signal and of an interfering signal, by using a reference signal. (Page 1, Lines 1-3) In accordance with at least

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presently preferred embodiment of the present invention, this is accomplished by compensating for the effect of the interfering signal in the cepstral domain. (Page 7, Line 15-17) As discussed in the application, in comparison with conventional two-channel compensation techniques operating in the cepstral domain as described heretofore, a two-channel compensation technique in accordance with at least one presently preferred embodiment of the present invention has the following characteristics:

- one channel contains speech recorded in a mismatching environment, and the other channel contains solely the source of mismatch (the source of mismatch here is thus assumed to be recordable: single source of noise, music, competing speech),
- the two-channel data are used in a decoding scheme, during the recognition process,
- the source of mismatch in the second channel is not assumed to be stationary: a new compensation vector is estimated for each input pair of frames.

(Page 9, Line 13 - Page 10, Line 8)

Claim 1 recites, *inter alia*, a first input medium which obtains an initial speech signal; a second input medium which obtains at least one interfering signal, wherein said one interfering signal is not statistically independent of said initial speech signal; a normalizing arrangement which reconciles the initial speech signal and at least one interfering signal with one another to produce a final speech signal; and said normalizing arrangement being adapted to account for non-stationary noise in the at least one

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interfering signal. (emphasis added) Similar language appears in the other independent claims.

It is respectfully submitted that Flanagan et al. clearly falls short of present invention (as defined by the independent claims) in that, *inter alia*, it does not disclose reconciling the initial speech signal and at least one interfering signal with another to produce a final speech signal. As discussed above, in Flanagan et al. there is no interfering signal. The same signal is recorded at different location (with close and distant microphones) and the two channels containing the two recordings of the same signal are used only during the training phase of the neural network. Flanagan et al. does not compensate for interference or noise but ONLY for channel mismatch (channel is different when speech is close or far from mic) and when the system is operating, i.e. trying to compensate for the channel, there is only one channel input available: the channel containing the distant speech. Accordingly, Applicants respectfully submit that the applied art does not anticipate the present invention because, at the very least, "[a]nticipation requires the disclosure in a single prior art reference of each element of the claim under construction." *W.L. Gore & Associates, Inc. v. Garlock*, 721 F.2d 1540, 1554 (Fed. Cir. 1983); *see also In re Marshall*, 198 U.S.P.Q. 344, 346 (C.C.P.A. 1978).

A 35 U.S.C. 103(a) rejection requires that the combined cited references provide both the motivation to combine the references and an expectation of success. Not only is there no motivation to combine the references, no expectation of success, but actually combining the references would not produce the claimed invention. Thus, the claimed invention is patentable over the combined references and the state of the art. It should be

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noted that the remarks previously presented with respect to the Section 103(a) rejections for Weinstein et al. are also applicable here, as it appears Flanagan et al. has merely been substituted for Weinstein et al. in those rejections and the remarks distinguishing the applied art have not been disputed by the Office.

Claims 5 and 13 stand rejected under 35 USC § 103(a) as being unpatentable over Flanagan et al. in view of Beirle. As presently understood, in Beirle it is recommended that there be a signal conditioning step in which the relative amplitudes of the input and reference signals adjusted before the signals are sent to the speech enhancement module. (See Col. 6, lines 30-35) This contrasts with the present invention, however, in which a "normalizing arrangement is adapted to estimate at least one characteristic of the at least one reference signal given at least one characteristic of the initial speech signal." Thus, it is respectfully submitted these rejections should be withdrawn.

Claims 6 and 14 stand rejected under 35 USC § 103(a) as being unpatentable over Flanagan et al. in view of Beirle and further in view of Sonmez et al. As presently understood, Sonmez et al. uses multiple codebooks: a reference codebook representing the characteristics of the speech features in the reference environment and several other codebooks representing the characteristics of the speech features in distinct and known environments. The Office Action asserts that "Sonmez et al. teach[es] the use of a single codebook referring to a signal characteristic for use in a normalizing arrangement." A review of Sonmez et al., however, shows there are at least two codebooks used. See Col. 3, lines 39-40 (a codebook for the reference environment denoted X_{ref}) and Col. 3, lines 46-48 (codebooks for the secondary environments denoted X_h with $h=1, \dots, H$). While

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the number of codebooks used Somez et al. is $H+1$, the minimum number used is 2 (in the case $H=1$). This contrasts with Claims 6 and 14, which recite "referring to a single codebook". Thus, it is respectfully submitted these rejections should be withdrawn.

Claims 7 and 15 stand rejected under 35 USC § 103(a) as being unpatentable over Flanagan et al. in view of Beirle and Sonmez et al. and further in view of Ammar et al. The previously presented comments on Ammar et al. are also applicable here. As presently understood, Ammar et al. teaches the use of a feedback compensation term (Figure 1), in which the enhanced speech output by the speech enhancement system is used as an input to compute the compensation term. This difference from the present invention in which there is no feedback. As set forth in the specification, the compensation term of Claims 7 and 15 is computed from the input and reference signals and the codebook vector. Thus, it is respectfully submitted these rejections should be withdrawn.

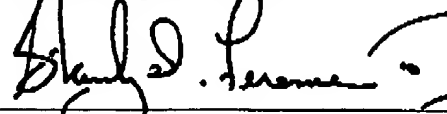
By virtue of dependence from what are believed to be allowable independent Claims 1 and 9, it is respectfully submitted that Claims 2-8 and 10-16 are also presently allowable. Applicants acknowledge that Claims 8 and 16 were indicated by the Examiner as being allowable if rewritten in independent form. Applicants reserve the right to file new claims of such scope at a later date that would still, at that point, presumably be allowable.

In summary, it is respectfully submitted that the instant application, including Claims 1-17, is presently in condition for allowance. Notice to the effect is hereby

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earnestly solicited. If there are any further issues in this application, the Examiner is
invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,



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